a heavy METAL *Solution*

Homegrown wastewater treatment technology puts China's leading copper mine ahead of the game

By Brad Marchant

The mining industry is under constant scrutiny when it comes to its processes for treating contaminated wastewater. The pressure on the industry to adopt more advanced and environmentally sustainable treatment processes is increasing as the mining industry experiences high growth rates.

Water management has always been one of the mining industry's most challenging long-term environmental liabilities. In fact, more than 70% of the world's mine sites produce water contaminated by metal from acid mine drainage and process streams. Metal- and sulphate-contaminated wastewater creates a lasting environmental liability that mining firms must manage for decades. The costs associated with this are significant.

BioteQ's new industrial water treatment plant, located at Jiangxi Copper Company's Dexing mine, China's largest copper mine.

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This recently commissioned plant treats acid mine drainage and other metal contaminated wastewater by removing metals, producing a saleable metal product and clean water that can be discharged safely to the environment.

The Problem with Lime Treatment

For many years, mining operations have relied on lime treatment to reduce the concentration of metals in wastewater. The water quality resulting from the process, however, does not meet many of today's water quality standards. As a result, secondary treatment processes are often needed, which can be both costly and complex to deploy. Another drawback of lime treatment is that it simply moves the metal contaminants from one form (water) to another (sludge). Because the sludge contains heavy metals, it must be stored and monitored—often for decades—creating a costly long-term environmental liability for mining firms.

Given the shortcomings and costs associated with lime treatment, responsible mining operations around the world are on the lookout for effective, affordable and economically sustainable ways to deal with this water treatment challenge. Recent innovations have led to industry-specific treatment technologies that now allow operations to remove toxins to produce clean water that will meet legislated quality standards, as well as turn their wastewater streams into a revenue-generating commodity. This sustainable approach to water treatment is gaining ground with a number of mine sites around the world, including sites owned by Jiangxi Copper Co. Ltd., China's largest copper producer.

A Joint Venture for a Solution

Jiangxi Copper is currently working with Vancouver-based BioteQ Environmental Technologies, Inc., to commission a 26-million yuan ($3.6 million Canadian dollars) water treatment plant at its Dexing site in southeast China. Using BioteQ's proprietary ChemSulphide process, the plant is able to remove copper from mine wastewater to produce a high-grade marketable copper product, along with water that is clean enough to be safely discharged to the environment or recycled into the mining process.

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The project began in 2006 with the signing of a joint venture agreement under the name JCC BioteQ Environmental Technologies Co. Ltd. Under the terms of the agreement, BioteQ's technology can be applied at six Jiangxi Copper sites. The Dexing plant—the first of the six—was commissioned in April 2008. Located near Dexing City in Jiangxi Province, this mining operation currently produces 100,000 tons of ore a day. It is estimated that the current resource will support 50 years of operation at current production rates.

The ChemSulphide process used at the new plant uses chemical sulphide reagents to remove and recover metals from contaminated water. In this process, chemical sulphide is added to a contactor tank where it mixes with the water to be treated under controlled conditions to selectively precipitate metals as a metal sulphide. The precipitated metals and treated water are then pumped to a clarifier tank where the clean water is separated from the metal solids and either discharged to the local environment or recycled. At that point, the metal solids are filtered to remove excess water, producing a high-grade metal product in the form of copper sulphide that is suitable for refining.

Technology Proves Sustainable

BioteQ's process is proven technology that is currently being used in mining operations in Canada, the U.S., China and Australia, with new plants under construction in Mexico, the U.S. and Chile. Depending on the mining operation, metals that can be recovered through this process include copper, zinc, nickel and cobalt. Toxic metals such as arsenic, antimony, lead, cadmium and manganese are also removed from the water. Recovery rates of metals for refining are greater than 99%.

In the joint venture with Jiangxi Copper Co., BioteQ is responsible for providing half of the capital investment to build the plants and is the operator of the water treatment plants. This arrangement reduces capital risk for Jiangxi Copper, while allowing it to leverage the benefits of a proven technology solution and in-depth operating expertise at a more affordable rate. At the same time, Jiangxi Copper can be proactive in reducing the environmental liability associated with alternative treatment processes. In addition, the sale of the metals recovered from the process can be applied to offset ongoing water treatment costs.

When fully operational, the Dexing plant will run 24 hours a day, seven days a week. It is initially expected to produce approximately one million pounds of copper annually, with production expanding in stages to 3.6 million lb per year.

As China's largest copper mining operation, the plant is setting an example in wastewater treatment that will have significant impact on mining operations in China moving forward. Jiangxi Copper Co.'s forward-thinking initiatives in this area will help to ensure environmental and economic sustainability in the years to come. WWD

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